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PERSONAL AUTHOR(S): Wendell A. Henry

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Phase 2 Summary:

The CNAPS compiler, assembler, application program interface, and Backpropagation Neural Network function library have been ported to the Windows 3.x environment and the CNAPS/PC hardware and integrated with the source-level debugger. The port of the graphical interface for the source-level debugger to Windows 3.x has been completed. These software tools are now in Beta test.

Phase 3 Summary:

Work has just begun.

At the time of this report, the project has been authorized to spend $1,100,000.00 for the Phase 1, 2, and 3 tasks and has accumulated expenses of $707,000.00. Phase 1 is completed. Phase 2 is nearly completed. Work has begun on Phase 3. The contract stipulates that $1,299,714.00 are required for the completion of the tasks in Phases 1, 2, and 3. Therefore, an additional $199,714.00 of funding must be authorized to complete all three phases of the project.

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22a. NAME OF RESPONSIBLE INDIVIDUAL: Wendell Henry	22b. TELEPHONE (Include Area Code): (503) 690-1236 — 22c. OFFICE SYMBOL:

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R & D Status Report

June 19, 1995

ARPA Order No.:

A407

Contractor:

Adaptive Solutions, Inc.

1400 NW Compton Drive, Suite 340

Beaverton, OR 97006

Contract No.:

N00014-93-C-0234

Contract Amount:

$1,299,714.00

Effective Date of Contract:

November 8, 1993

Expiration Date of Contract:

June 7, 1996

Principal Investigator:

Wendell A. Henry

Telephone Number:

(503) 690-1236

Title of Project:

High Performance Hardware and Software for Pattern Recognition and Image Processing

Title of Work:

R&D Status Report

Reporting Period:

March 1, 1995 through May 31, 1995

Disclaimer

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Advanced Research Projects Agency of the U. S. Government.

Project Summary:

Phase 1 Objective:

Build PC/AT form-factor plug-in board using which implements the CNAPS architecture.

Phase 2 Objective:

Port CNAPS Software Development Kit to CNAPS PC board and Windows environment.

Phase 3 Objective:

Design and implement a C-callable function library providing image processing and neural network emulation operations which uses the CNAPS/PC board built in Phase 1.

Phase 1 summary:

Done.

Phase 2 Summary:

The CNAPS Development Environment consists of several software tools required by the software developer. These are:

CNAPS application program interface
CNAPS-C compiler
CNAPS assembler
CNAPS source-level debugger (command-line and graphical interfaces)
CNAPS Backpropagation Neural Network function library

The CNAPS compiler, assembler, application program interface, and Backpropagation Neural Network function library have been ported to the Windows 3.x environment and the CNAPS/PC hardware and integrated with the source-level debugger. The port of the graphical interface for the source-level debugger to Windows 3.x has been completed. These software tools are now in Beta test.

Phase 3 Summary:

Work has just begun.

At the time of this report, the project has been authorized to spend $1,100,000.00 for the Phase 1, 2, and 3 tasks and has accumulated expenses of $707,000.00. Phase 1 is completed. Phase 2 is nearly completed. Work has begun on Phase 3. The contract stipulates that $1,299,714.00 are required for the completion of the tasks in Phases 1, 2, and 3. Therefore, an additional $199,714.00 of funding must be authorized to complete all three phases of the project.

Description of Progress:

The previous Project R&D Status Report stated the following as the objectives for this reporting period:

1. *Porting of the graphical interface for the CNAPS source-level debugger will be completed. The debugger will be in Beta test.*
2. *Support of all software tools, including bug fixes, during Beta testing will continue.*
3. *Phase 3 efforts will begin. This includes the start of definition of a C and C++ callable image processing and neural network emulation function library.*

The following sections discuss the specific progress made in this reporting period in the hardware and software areas towards the stated objectives.

Hardware

Design:

No changes to the hardware design took place this reporting period.

Testing:

Production shipments of the CNAPS/PC, Revision-level 2 board commenced.

Software

Design and Implementation:

The port and implementation of the command-line and graphical interface versions of the source-level debugger have been completed. Both versions of the debugger have been integrated with the CNAPS-C compiler and the CNAPS assembler. The CNAPS compiler, assembler, and both source-level debuggers (the CNAPS Software Development Kit) are now in Beta test (software revision 1.1.1).

The Backpropagation Neural Network application software (formerly called BuildNet) which has been implemented as a Dynamic Link Library and now called BP.DLL is still in Beta test (software revision b1.5).

Work has begun on Phase 3 of this project. Definition of a C-callable Function Library for image processing and neural network emulation operations has been started. This function library will provide high-level access to CNAPS processing power without requiring the software application developer to create code that actually runs on the CNAPS SIMD array. The library of functions provides the CNAPS executable code as callable routines.

Analysis of possible Function Library architectures is in progress. Example applications using prototype functions are being developed to provide the basis for assessment of the flexibility, capability, and performance of C-callable functions.

Testing:

Beta testing of the CNAPS Software Development Kit (SDK) continues.

Beta testing of the BP.DLL neural network function library continues.

Deliverables

The ten (10) CNAPS/PC boards (revision-level 1) sent to ARPA as a deliverable of Phase 1 have been replaced with CNAPS/PC (revision-level 2) boards. They were delivered to:

PRC, Inc.	Attn.: Kevin Kitka	7 Units
Defense Group, Inc.	Attn.: Morgan Grover	1 Unit
David Taylor Model Basis	Attn.: David Hess	1 Unit
Army Research Lab	Attn.: Jeff DeHart	1 Unit

Ten (10) copies of the CNAPS Software Development Kit (version 1.1.1) have been delivered to the current users of the ten (10) CNAPS/PC boards. They were delivered to:

PRC, Inc.	Attn.: Kevin Kitka	7 Units
Defense Group, Inc.	Attn.: Morgan Grover	1 Unit
David Taylor Model Basis	Attn.: David Hess	1 Unit
Army Research Lab	Attn.: Jeff DeHart	1 Unit

Issues and/or Concerns

None.

Plans For Next Reporting Period:

During the next three months work will continue on Phase 2 of the contract and the following are expected to be achieved:

1. Support of the software and hardware products, including bug fixes, during Beta testing will continue.
2. Phase 3 efforts will continue. Specification of the Function Library architecture will continue.
3. Preliminary assessment of the performance of an example application using C-callable functions versus custom coding of the CNAPS modules will have been completed.
4. The Backpropagation Neural Network application software (formerly called BuildNet) which has been implemented as a Windows Dynamic Link Library, BP.DLL, (software revision b1.5) will be delivered.

Fiscal Status:

Amount currently provided on contract:	$1,299,714.00
Expenditures and commitments to date:	707,000.00
Funds required to complete work:	$592,714.00
Authorized Phase funding:	$1,100,000.00
Expenditures and commitments to date:	707,000.00
Authorized Phase funds remaining:	$393,000.00

At the time of this report, the project has expenditures and commitments totaling 64% of the funds allocated for Phases 1, 2, and 3 of the contract.

Wendell A. Henry 6/21/95

Wendell A. Henry Date